

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

REC'D 04 MAY 2004

WIPO PCT

Applicant's or agent's file reference AMS.P51871WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/GB 03/00050	International filing date (day/month/year) 09.01.2003	Priority date (day/month/year) 11.01.2002
International Patent Classification (IPC) or both national classification and IPC G01V1/36		
Applicant WESTERNGEICO SEISMIC HOLDINGS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.
3. This report contains indications relating to the following items:
- I  Basis of the opinion
  - II  Priority
  - III  Non-establishment of opinion with regard to novelty, inventive step and Industrial applicability
  - IV  Lack of unity of invention
  - V  Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or Industrial applicability; citations and explanations supporting such statement
  - VI  Certain documents cited
  - VII  Certain defects in the international application
  - VIII  Certain observations on the international application

Date of submission of the demand  07.08.2003	Date of completion of this report  03.05.2004
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Schneiderbauer, K Telephone No. +49 89 2399-7613



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB 03/00050

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-19 as originally filed

**Claims, Numbers**

1-23 as originally filed

**Drawings, Sheets**

1/8-8/8 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*
6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-23
	No: Claims	
Inventive step (IS)	Yes: Claims	1-23
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-23
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB03/00050

**1.) Reference** is made to the following documents:

- D1: US-A-5 191 557 (SALEHI IRAJ A ET AL) 2 March 1993 (1993-03-02)
- D2: WO 01 53854 A (SCHLUMBERGER CA LTD ; SCHLUMBERGER HOLDINGS (CA); SCHLUMBERGER SERV) 26 July 2001 (2001-07-26)
- D3: AMUNDSEN L: 'WAVENUMBER-BASED FILTERING OF MARINE POINT-SOURCE DATA' GEOPHYSICS, SOCIETY OF EXPLORATION GEOPHYSICISTS, TULSA, US, vol. 58, no. 9, 1 September 1993 (1993-09-01), pages 1335-1348
- D4: AMUNDSEN L.: 'Decomposition of multicomponent sea-floor into upgoing and downgoing p- and s-waves' GEOPHYSICS, vol. 60, no. 2, 1995, pages 563-572,

**2.) Technical field:** seismic data processing

**3.) Novelty (Art.33(1),(2) PCT) and inventive step (Art.33(1),(3) PCT):**

US5191557 (D1) is considered to be the closest prior art document. In D1 a spatial filter is used to obtain either the direct arrivals or the reflection arrivals from the cross-correlated signal (cross correlation of the acquired record and the drill signal). There is no disclosure of carrying out wavefield separation on the acquired data to separate the acquired data into up- and downgoing components and then identifying the direct arrival of the acoustic energy at the receiver using the downgoing component. This is disclosed by the present invention (independent method claim 1 and independent apparatus claim 16) and solves the problem of identifying the direct arrival also for large offsets.

The other documents D2 to D4 disclose the step of wavefield separation but do not hint to the additional step of using the downgoing component for a subsequent identification of the direct arrival of acoustic energy at the receiver.

The combination of both steps is not regarded as merely defining conventional wavefield separation.

**4.) Dependent claims:**

Claims 2-15 are dependent on claim 1 and claims 17-23 are dependent on claim 16. They do as such also meet the requirements of the PCT with respect to novelty and inventive step.

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**5.) Industrial applicability (Art.33(1),(4) PCT)**

Beyond any doubt the invention, as defined in claims 1-23, is industrially applicable.